1. A band model method for computing individual atomic and molecular species spectral transmittances through a gaseous medium, comprising:

dividing the spectral region being considered into a number of spectral bins, each having a width of less than 1.0 cm^{-1};

calculating the equivalent width of atomic and molecular transitions centered within each spectral bin; and

calculating line tail absorption within each spectral bin from atomic and molecular transitions not centered within the bin.

2. The method of claim 1, wherein the spectral bins have a width of about 0.1 cm^{-1}.

3. The method of claim 1 wherein the calculating step includes calculating, from an exact expansion, the bin Voigt equivalent width of atomic and molecular transitions whose centers lie within each spectral bin.

4. The method of claim 3, wherein the exact expansion is an exact modified Bessel functions expansion.

5. The method of claim 3, wherein the calculating step includes subtracting line-tail absorption as calculated from the column strength, the Lorentz half-width, the Doppler half-width, and the line tail spectral displacement.

6. The method of claim 3, wherein the calculating step includes determining the Voigt line-shape function computed at specific frequencies.

7. The method of claim 1, wherein the line tail calculation step includes calculating line tail absorption within each bin from atomic and molecular transitions centered outside of the bin using Padé approximant spectral fits to Voigt absorption coefficient curves.

8. The method of claim 7, wherein the line tail absorption calculation step includes determining a database of temperature and pressure dependent Padé approximant spectral fits to Voigt absorption coefficient curves.

9. The method of claim 8, wherein there are five Padé parameters.

10. The method of claim 8, wherein Padé parameters are determined from summed line tail spectral absorption coefficients.

11. The method of claim 10, wherein one Padé parameter is determined at the center of the bin, and one at each edge of the bin.

12. The method of claim 10, wherein one Padé parameter is the derivative of the absorption coefficient with respect to the normalized spectral variable at the line center.

13. The method of claim 10, wherein one Padé parameter is the integral of the spectral absorption coefficient over the spectral band.

14. The method of claim 8, wherein the Padé parameters database is generated for a plurality of temperatures.

15. The method of claim 8, wherein the Padé parameters database is determined for a plurality of pressures.

16. The method of claim 1, wherein the equivalent widths are calculated from atomic and molecular transitions centered no more than half a spectral bin width from the bin, and the line tail absorptions are calculated from atomic and molecular transitions not centered within a half spectral bin from the bin.

17. A band model method for determining the contribution of line centers to the computation of individual atomic and molecular species spectral transmittances through a gaseous medium, comprising:

dividing the spectrum being measured into a number of spectral bins; and

calculating the bin Voigt equivalent width of atomic and molecular transitions centered within each spectral bin from an exact expansion.

18. The method of claim 17, wherein the spectral bins have a width of less than 1.0 cm^{-1}.

19. The method of claim 18, wherein the spectral bins have a width of about 0.1 cm^{-1}.

20. The method of claim 17, wherein the exact expansion is an exact modified Bessel functions expansion.

21. The method of claim 17, wherein the calculating step includes subtracting line-tail absorption as calculated from the column strength, the Lorentz half-width, the Doppler half-width, and the line tail spectral displacement.

22. The method of claim 17, wherein the calculating step includes determining the Voigt line-shape function computed at specific spectral frequencies.

23. A method for determining the contribution of line tails to the computation of individual atomic and molecular species spectral transmittances through a gaseous medium, comprising:

dividing the spectral region being considered into a number of spectral bins; and

calculating line tail absorption within each bin from atomic and molecular transitions centered outside of the bin using Padé approximant spectral fits to Voigt absorption coefficient curves.

24. The method of claim 23, wherein the calculating step includes determining a database of temperature and pressure dependent Padé approximant spectral fits to Voigt absorption coefficient curves.

25. The method of claim 24, wherein there are five Padé parameters.

26. The method of claim 24, wherein Padé parameters are determined from summed line tail spectral absorption coefficients.

27. The method of claim 26, wherein one Padé parameter is determined at the center of the bin, and one at each edge of the bin.

28. The method of claim 24, wherein one Padé parameter is the derivative of the absorption coefficient with respect to the normalized spectral variable at the line center.

29. The method of claim 24, wherein one Padé parameter is the integral of the spectral absorption coefficient over the spectral band.

30. The method of claim 24, wherein the Padé parameter database is generated for a plurality of temperatures.

31. The method of claim 24, wherein the Padé parameter database is determined for a plurality of pressures.

32. The method of claim 23, wherein the spectral bins have a width of less than 1.0 cm^{-1}.

33. The method of claim 32, wherein the spectral bins have a width of about 0.1 cm^{-1}.